

# HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

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**Hatchery Program:**

Chambers Creek Fall Chinook  
Yearling Program

**Species or  
Hatchery Stock:**

Fall Chinook (*Onchorynchus tshawytscha*)  
Chambers Creek (Garrison Springs)

**Agency/Operator:**

Washington Department of Fish and Wildlife

**Watershed and Region:**

Chambers Creek  
Puget Sound

**Date Submitted:**

August 23, 2002

**Date Last Updated:**

August 20, 2002

## **SECTION 1. GENERAL PROGRAM DESCRIPTION**

### **1.1) Name of hatchery or program.**

Chambers Creek Yearling Fall Chinook Program

### **1.2) Species and population (or stock) under propagation, and ESA status.**

Chambers Creek Fall Chinook (*Oncorhynchus tshawytscha*)

### **1.3) Responsible organization and individuals**

**Name (and title):** Ron Warren, Region 6 Fish Program Manager  
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**Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:**

NA

### **1.4) Funding source, staffing level, and annual hatchery program operational costs.**

This program is funded through the Puget Sound Recreational Enhancement Program.

### **1.5) Location(s) of hatchery and associated facilities.**

All three locations are on Chambers Creek (WRIA 12.0007)

**Garrison Springs Hatchery:** This facility is located on the grounds of Western State Hospital in Steilacoom, Washington. The physical address is 9601 Steilacoom Blvd Drawer A Tacoma 98498. Garrison is located in close proximity to Chambers Creek (less than 0.5 miles) behind the paper mill .

**Chambers Creek Hatchery:** The physical address is 8315 Phillips Rd. South West, Suite A. Chambers is located at RM 3.5.

**Lakewood Hatchery:** The physical address for Lakewood is 7723 Phillips Rd. SW, Tacoma, WA. 98498. It is located at RM 3.4.

**1.6) Type of program.**

Isolated harvest

**1.7) Purpose (Goal) of program.**

Augmentation.

The goal of this program is to provide adult fish for harvest opportunity.

**1.8) Justification for the program.**

This program will be operated in a manner which will not negatively effect listed fish by releasing fish as smolts as programmed in the Future Brood Document (FBD). The 1997 brood year fish (1999 releases) are 100% adipose-fin clip/coded-wire tagged which will allow for selective fisheries (harvest opportunity) in mixed stock areas to minimize impacts on weak or protected stocks as well as identifying the hatchery fall chinook production, the NOR's, total survival, fisheries contribution and straying to other watersheds. The 1998 and 1999 broods were 100% mass marked (adipose-fin clip only).

**1.9) List of program "Performance Standards".**

**1.10) List of program "Performance Indicators", designated by "benefits" and "risks."**

Performance Standards and Indicators for Puget Sound **Isolated Harvest** Chinook programs.

Performance Standard	Performance Indicator	Monitoring and Evaluation Plan
Produce adult fish for harvest	Survival and contribution rates	Monitor catch and cwt data
Meet hatchery production goals	Number of juvenile fish released - <b>300,000</b>	Future Brood Document (FBD) and hatchery records
Manage for adequate escapement where applicable	Hatchery return rates	Hatchery return records

Minimize interactions with listed fish through proper broodstock management and mass marking. Maximize hatchery adult capture effectiveness. Use only hatchery fish	Number of broodstock collected - <b>870 adults (see section 1.11)</b>	Rack counts and CWT data
	Stray Rates	Spawning guidelines
	Sex ratios	Hatchery records
	Age structure	
	Timing of adult collection/spawning - <b>August to October</b>	Spawning guidelines
	Adherence to spawning guidelines - <b>1:1 with 5 fish pools</b>	Hatchery records
	Total number of wild adults passed upstream - <b>Beginning in 2001 no fish passed upstream</b>	
Minimize interactions with listed fish through proper rearing and release strategies	Juveniles released as smolts	FBD and hatchery records
	Out-migration timing of listed fish / hatchery fish / <b>May</b>	FBD and historic natural outmigration times
	Size and time of release <b>6 fpp/ late April to May</b>	FBD and hatchery records
Maintain stock integrity and genetic diversity	Size and time of release <b>6 fpp/ late April to May</b>	CWT data and hatchery records (marked vs unmarked)
	Effective population size	Spawning guidelines
	Hatchery-Origin Recruit spawners	

<p>Maximize in-hatchery survival of broodstock and their progeny; and</p> <p>Limit the impact of pathogens associated with hatchery stocks, on listed fish</p>	<p>Fish pathologists will monitor the health of hatchery stocks on a monthly basis and recommend preventative actions / strategies to maintain fish health</p>	Co-Managers Disease Policy
	<p>Fish pathologists will diagnose fish health problems and minimize their impact</p>	Fish Health Monitoring Records
	<p>Vaccines will be administered when appropriate to protect fish health</p>	
	<p>A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings</p>	
	<p>Fish health staff will present workshops on fish health issues to provide continuing education to hatchery staff.</p>	
<p>Ensure hatchery operations comply with state and federal water quality standards through proper environmental monitoring</p>	<p>NPDES compliance</p>	<p>Monthly NPDES records</p>

### 1.11) Expected size of program.

#### 1.11.1) Proposed annual broodstock collection level (maximum number of adult fish).

The fall chinook yearlings program for Lakewood and Chambers Creek hatcheries are taken from the Garrison Springs fall chinook egg take of 1,350,000 (870 adults). Lakewood Hatchery releases 200,000 yearlings and Chambers Creek Hatchery releases 100,000 yearlings. No adult collection facilities are at Lakewood or Chambers Hatchery.

**1.11.2) Proposed annual fish release levels (maximum number) by life stage and location.**

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		
Fry		
Fingerling		
Yearling	Chambers Creek	300,000

**1.12) Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.**

For two years of tag data (93 BY and 97 BY (preliminary data)) the average survival rate is .57%.

Broodstock levels back to the hatchery rack for brood years 1995 through 2001 were 1,490, 1,670, 1,472, 1,592, 773, 892, and 1,045, respectively.

**1.13) Date program started (years in operation), or is expected to start.**

Program releases of fall chinook yearlings began at Lakewood in May of 1999. Program releases of yearling fall chinook began at Chambers in March 1998

**1.14) Expected duration of program.**

Ongoing.

**1.15) Watersheds targeted by program.**

Chambers Creek (WRIA 12.0007)

**1.16) Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.**

This program is limited by the amount of rearing space available at the release locations(Lakewood and Chambers).

## **SECTION 2. PROGRAM EFFECTS ON ESA-LISTED SALMONID POPULATIONS.**

### **2.1) List all ESA permits or authorizations in hand for the hatchery program.**

None.

### **2.2) Provide descriptions, status, and projected take actions and levels for ESA-listed natural populations in the target area.**

#### **2.2.1) Description of ESA-listed salmonid population(s) affected by the program.**

##### **- Identify the ESA-listed population(s) that will be directly affected by the program.**

None.

There are no ESA-listed natural salmonid populations in the program target area (Chambers Creek). In this watershed, adult chinook returns and any resulting natural production are dependent upon local hatchery program production. The available habitat is not judged to be typical, productive fall chinook habitat and would not likely support a self-sustaining, naturally spawning fall chinook population. If the local hatchery production program was terminated, it is expected that natural chinook production in this watershed would eventually disappear. These opinions could be tested by identifying all hatchery fall chinook production in this watershed and monitoring natural production/productivity.

##### **- Identify the ESA-listed population(s) that may be incidentally affected by the program.**

**Nisqually Summer/Fall Chinook.** Stock-specific spawning ground, juvenile life history, survival and productivity data are generally lacking for this natural population. The population is presumed to be similar in biological characteristics to the other South Puget Sound fall chinook populations (Puyallup River and Green River fall chinook). Adults are presumed to be predominantly 4-year-olds at return (likely 60-80%), with smaller components of 2-year-olds (<10%), 3-year-olds (10-20%), 5-year-olds (5-10%) and 6-year-olds (<1%). Size at age is expected to be similar to the data listed below for Puyallup and Green River fall chinook.

Chinook spawning habitat in the mainstem Nisqually River is available from river mile 3 to just above the mouth of the Mashel River (approximately river mile 40). Chinook have been documented spawning in the accessible reaches of the Mashel River and Ohop Creek. There is occasional chinook utilization of 25 Mile Creek, a tributary to Ohop Lake.

River entry of mature adults begins in July and extends through September. Spawning occurs from early September through October. Most Nisqually River fall chinook juveniles likely migrate to salt water as zero age smolts after only a few months of freshwater residence. If migration timing is similar to Green River stock, the outmigration likely peaks in May. After several weeks of estuarine acclimation and feeding, the juveniles move off to feeding grounds in Puget Sound and the Pacific Ocean.

**South Sound Tribs Summer/Fall Chinook.** Stock-specific spawning ground, juvenile life history, survival and productivity data are generally lacking for this natural population. The population is presumed to be similar in biological characteristics to the other south Puget Sound fall chinook populations (Puyallup River and Green River fall chinook), since it is thought to be dependent on ongoing hatchery production (strays) in south Puget Sound. SASSI defines this stock as naturally spawning chinook in a number of widely distributed rivers, including McAllister Creek, Grovers Creek, Gorst Creek, Chambers Creek, Carr Inlet tributaries, the Deschutes River and other small streams in south Puget Sound.

**2.2.2) Status of ESA-listed salmonid population(s) affected by the program.**

**- Describe the status of the listed natural population(s) relative to “critical” and “viable” population thresholds**

Critical and viable population thresholds under ESA have not been determined, however, the SASSI report determined that status of the South Sound Tributary Summer/Fall Chinook and Nisqually Summer/Fall Chinook stocks are "healthy".

**- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.**

No data at this time.



**- Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.**

Estimates of fall chinook spawning naturally in the Nisqually River:

<u>Year</u>	<u>Spawning numbers</u>
1988	1342
1989	2332
1990	994
1991	953
1992	106
1993	1655
1994	1730
1995	817
1996	606
1997	340
1998	834
1999	1399

Estimates of fall chinook spawning naturally in South Sound Tributaries:

<u>Year</u>	<u>Spawning numbers</u>
1988	4257
1989	4979
1990	15814
1991	3681
1992	3610
1993	2998
1994	4950
1995	7456
1996	14931
1997	4192
1998	6372
1999	11028

**- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.**

Nisqually River fall chinook - Unknown. There are inadequate spawning ground sampling data to estimate proportions.

South Sound Tributaries fall chinook - Unknown, although SASSI states that stock status is dependent upon local hatchery production.

**2.2.3) Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take**

**- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.**

Possible predation by yearling releases migrating into nearshore areas of Puget Sound in the spring.

**- Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.**

NA

**-Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).**

Unknown.

**- Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.**

NA

### **SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES**

**3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the NPPC *Annual Production Review Report and Recommendations* - NPPC document 99-15). Explain any proposed deviations from the plan or policies.**

There are no applicable plans or policies.

**3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.**

Puget Sound Salmon Management Plan.

**3.3) Relationship to harvest objectives.**

**3.3.1) Describe fisheries benefitting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.**

Information not available until returns of first release group can be analyzed (program releases of fall chinook yearlings began at Lakewood in May of 1999 and releases of yearling fall chinook began at Chambers Creek in March 1998.

**3.4) Relationship to habitat protection and recovery strategies.**

Habitat protection and restoration efforts in this watershed are primarily focused on improving passage, spawning and rearing conditions for the local coho, cutthroat and chum populations. There are minimal opportunities to increase natural chinook productivity in this watershed through habitat management initiatives.

**3.5) Ecological interactions.**

Predation/competition on listed fish by the yearling fall chinook program at Chambers Creek and Lakewood are unknown at this time (Risk Assessment, WDFW, 2000). WDFW shall apply coded-wire tags to the yearling group to allow for evaluation of straying levels to other Puget Sound watersheds.

Increasing pinniped populations in Puget Sound may be negatively affecting survival of this program's production.

## **SECTION 4. WATER SOURCE**

**4.1) Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.**

Lakewood receives 340,000 fry from Garrison to be reared in round ponds on spring water which has a temperature range between 54 and 58 degrees Fahrenheit. Chambers receives 70,000 fingerlings to be reared in raceways on spring water (54 degrees) and well water (52 degrees).

**4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.**

No listed fish in watershed. Water source is spring or well water. No screening involved.

## **SECTION 5. FACILITIES**

### **5.1) Broodstock collection facilities (or methods).**

There are no adult trapping facilities at Lakewood or Chambers. Eggs are taken at the Chambers Creek trap. For more detailed information on the collection procedures review the Chambers Creek (Garrison Springs) fingerling HGMP.

### **5.2) Fish transportation equipment (description of pen, tank truck, or container used).**

1. 400 gallon fry tank with aerator and oxygen
2. 900 gallon tanker with aerator and oxygen
3. 1,000 gallon tanker with aerator and oxygen

### **5.3) Broodstock holding and spawning facilities.**

There are no adult trapping facilities at Lakewood or Chambers. See section 5.1.

### **5.4) Incubation facilities.**

Chambers (Garrison Springs) incubates the eggs earmarked for yearling production for Chambers and Lakewood. Incubation is in 12 vertical stack incubators (8 trays per stack). The top tray is left empty for filtering out debris, the rest of the trays are loaded at 5,500 eggs per tray. Flow is 3 gpm.

### **5.5) Rearing facilities.**

Rearing at Lakewood consists of 10 round ponds (40 feet in diameter, 2 feet deep) and a large dirt pond (160,000 cubic feet). Chambers consists of 4 raceways 20'X100' X 3'.

### **5.6) Acclimation/release facilities.**

Lakewood has a large dirt pond on spring water for fish release. Chambers can put creek water mixed with well and spring water for acclimation at time of release.

### **5.7) Describe operational difficulties or disasters that led to significant fish mortality.**

Water quality is poor at Chambers Creek. High summer temperatures and pathogen infestation can cause high loss and limits the number of fish that can be raised there. Several measures have been taken to reduce stress and increase survival of these fish including installation of sprinklers, good predator protection and new methods for removing loss which limits human contact with the fish.

**5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.**

Lakewood round ponds and large dirt pond are gravity fed, however, each bank of ponds and each incubation head box has a float alarm. Facilities are inspected and maintained daily, a stand-by person is on call 24 hours a day to answer alarms. Chambers Creek also has alarms on their intake and ponds.

## **SECTION 6. BROODSTOCK ORIGIN AND IDENTITY**

**Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.**

### **6.1) Source.**

Fall chinook returning to the Chambers Creek trap.

### **6.2) Supporting information.**

#### **6.2.1) History.**

This supporting information details the history of the Chambers Creek/Garrison stock (the stock of choice for this program).

Between 1972 and 1980 four stocks, or combinations of stocks, were used to support the Garrison program: Minter Creek, Rivers' Inlet x Deschutes, Portage Bay (UW), Voights Creek and Voights Creek x Deschutes.

Between 1980 and 1990 seven stocks, or combinations of stocks, were used including Green River x Issaquah, Portage Bay (UW), Big Soos Creek, Samish, Deschutes and Garrison.

From 1990 to the present, the predominate stock that is used is the adult fish returning to Chambers trap. Planting records list this stock as Garrison, in several years, and then changed to Chambers Creek in more recent years.

#### **6.2.2) Annual size.**

870 ( for total program; fingerlings and yearlings) adults.

#### **6.2.3) Past and proposed level of natural fish in broodstock.**

Past levels of natural fish in broodstock are unknown. WDFW shall continue to use gametes procured from fall chinook salmon adults volunteering to the Chambers Creek Trap to effect this program. The intent is to collect localized hatchery-origin broodstock at this location.

#### **6.2.4) Genetic or ecological differences.**

Unknown

#### **6.2.5) Reasons for choosing.**

Locally adapted South Sound stock.

**6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.**

Adults used in broodstock selection are hatchery-origin marked fish.



## **SECTION 7. BROODSTOCK COLLECTION**

### **7.1) Life-history stage to be collected (adults, eggs, or juveniles).**

Adult

### **7.2) Collection or sampling design.**

Information for this section is from the Garrison Springs fingerling fall chinook program.

Collection method is by fish trap. The fish trap is located at a diversion dam which effectively blocks fish passage. This allows us to trap 100% of all fish moving upstream while the fish ladder is screened off. The trap is in the fishing mode during the months of August through February. Broodstock are collected and spawn in the months of August through October. The remainder of the time the trap is used to count fish migrating upstream to spawn including coho and winter chum.

### **7.3) Identity.**

The 1999 releases of fall chinook were 100% adipose-fin clip/coded-wire tagged while the 2000 and 2001 releases were mass marked. All broodstock will be identified by a adipose-fin clip.

### **7.4) Proposed number to be collected:**

#### **7.4.1) Program goal (assuming 1:1 sex ratio for adults):**

870 adults (for both programs; fingerlings and yearlings).

**7.4.2) Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:**

Year	Adults Females	Males	Jacks	Eggs	Juveniles
1988					
1989					
1990					
1991					
1992					
1993					
1994					
1995	321	276	5	1,284,000	
1996	400	301	69	1,529,000	
1997	194	244	17	727,500	
1998	603	683	14	2,534,810	
1999	278	241		1,249,000	
2000	123	127		703,600	
2001	163	206	1	641,700	

**7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.**

There is no established upstream escapement goal for fall chinook on Chambers Creek, as the natural production potential of this is presumed to be limited. Beginning with the 2001 return, no surplus chinook will be passed above the rack. If fish still remain after all goals are achieved then they are supplied to nutrient enhancement programs, donated to food banks, buried, sent to a rendering plant or may be surplussed to the state contracted carcass buyer.

**7.6) Fish transportation and holding methods.**

Fish, for this project, are selected at random from the spawning population at Chambers trap, injected with Erthromycin and then transported to Garrison Springs for holding and spawning.

**7.7) Describe fish health maintenance and sanitation procedures applied.**

All females are injected with Aquamycin for Bacterial Kidney Disease (BKD) prevention. At spawning, samples are taken from each fish and tested for BKD prevalence in ovarian fluid, kidney and spleen. The females are identified and kept separate in incubators so they can be culled out if the prevalence of BKD is too high in the samples (Co-Managers Fish Health Policy, 1998) .

**7.8) Disposition of carcasses.**

Fish carcasses are disposed of through a contract buyer, buried, supplied to nutrient enhancement programs or sent to a rendering plant. Unspawned carcasses may be donated to food banks.

**7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.**

The 1999 releases of fall chinook were 100% adipose-fin clip/coded-wire tagged while the 2000 and 2001 releases were mass marked. All broodstock will be identified by a adipose-fin clip.

## **SECTION 8. MATING**

**Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.**

### **8.1) Selection method.**

Spawners are selected randomly from the pond, checked for ripeness, processed or returned to the pond as green. Spawning occurs, on average, two days per week. Spawning runs from late September to late October. The peak of spawning is in mid-October (Spawning Guidelines and Genetics Manual, Seidel, 1983).

### **8.2) Males.**

Males are spawned at a rate of one male per one female. 3 jacks per 100 males are used randomly in the spawning population.

### **8.3) Fertilization.**

Each female is spawned into a separate container. An equal number of males are randomly selected and spawned into individual bags (five fish pools). All gametes are transported on ice to the incubation site at Garrison. Eggs are fertilized using one bag of milt (5 males) for 5 females. Spawning occurs twice weekly and lasts from late September to late October. The peak of spawning occurs in mid to late October.

Sanitation and fish health is maintained by using iodophore during the water hardening process and for clean up. Iodophore is used in accordance with the WDFW Fish Health Manual (1996). Personnel working at multiple sites are required to disinfect raingear and boots prior to working in a new water source.

### **8.4) Cryopreserved gametes.**

NA

### **8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.**

The 1999 releases (97' brood) of fall chinook were 100% adipose-fin clip/coded-wire tagged while the 2000 and 2001 releases were mass marked. All broodstock used in the mating scheme will be identified by a adipose-fin clip.

## **SECTION 9. INCUBATION AND REARING -**

Specify any management *goals* (e.g. “egg to smolt survival”) that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

### **9.1) Incubation:**

#### **9.1.1) Number of eggs taken and survival rates to eye-up and/or ponding.**

The following information is for the two years eggs were incubated at Garrison.

Brood Year	Survival to eye-up
1999	89.0%
1998	64.0%

#### **9.1.2) Cause for, and disposition of surplus egg takes.**

Egg take surpluses to program goals were the result of better than expected egg/fry survival and efforts to produce more fish for the program. Surplus fish were planted as fed or unfed fry into Lake Steilacoom. The present program is directed by the Future Brood Document (FBD) and the management of egg-take goals are designed to minimize egg surplus. Beginning with the 2001 brood, surplus fry will be released into landlocked lakes, only.

#### **9.1.3) Loading densities applied during incubation.**

Garrison Springs incubates the eggs earmarked for yearling production at Chambers and Lakewood. Incubation is in 12 vertical stack incubators (8 trays per stack). The top tray is left empty for filtering out debris, the rest of the trays are loaded at 5,500 eggs per tray. Flow is 3 gallons per minute (gpm).

#### **9.1.4) Incubation conditions.**

Incubators are monitored/cleaned daily, as needed, to prevent suffocation (at Garrison Springs). Water quality is excellent and little debris enters the incubation system. Water temperatures are recorded daily to maintain Temperature Unit (TU) data to assist in identifying eye-up, hatch and ponding dates.

### **9.1.5) Ponding.**

Fish are ponded at approximately 1,800 TU's. Ideally, fish are at least 70% buttoned-up and actively swimming up. A Condition (KD) factor of 1.95 is desirable. Ponding is not volitional. Fish are ponded between December 15 and January 30th.

### **9.1.6) Fish health maintenance and monitoring.**

A daily formalin drip is used to control fungus on incubating eggs. Eggs are shocked at 550 TU's, picked by hand or salt-dipped to remove dead eggs. The eyed eggs are recounted and put down to hatch. After ponding fish are inspected by a fish health specialist on a monthly basis until release. Gills, skin, blood and internal organs are inspected for pathogens. The rearing program is reviewed, including fish density parameters, water flow, feeding program and fish loss. If loss is up and treatable pathogens are detected, prescriptions are given for treatment based on the pathologist review.

### **9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.**

The intent is to incubate localized hatchery-origin fish at this location.

## **9.2) Rearing:**

**9.2.1) Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available.**

### **9.2.2) Density and loading criteria (goals and actual levels).**

Goals (maximum at release)

10.0 pounds per gallons per minute (lbs/gpm) at release

0.75 pounds per cubic foot (lbs/cubic ft.) at release

0.2 Density index maximum at release

Actual

11.0 lbs./gpm at release

0.75 lbs./cubic ft. at release

<0.2 Density index at release

### 9.2.3) Fish rearing conditions

Fish rearing parameters such as loadings, flows, feeding levels and pond cleaning are accomplished weekly. Water temperatures are monitored daily and feed rates are adjusted accordingly. Lakewood ponds on spring water have a temperature range between 54 and 58 degrees Fahrenheit. Chambers' raceways are on spring water (54 degrees), well water (52 degrees) and surface water.

### 9.2.4) Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

For 1999 brood, one group

Date	Length(mm)	Fish/lb.
4/6/99		107.0
5/17/99		83.5
6/7/99		62.0
7/12/99		51.0
8/30/99		45.0
9/7/99		29.0
10/16/99		22.0
11/8/99		15.4
12/29/99		14.0
1/20/00		10.7
02/29/00		9.8
03/15/00		8.3
04/1/00		6.0

### 9.2.5) Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

NA

### 9.2.6) Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

The following feed types are used for this program: Bio-Diet Starter #3, Bio-Diet Grower 1.0 mm, 1.5 mm, Moore-Clark Fry 2.0 mm and 2.5 mm. For the 1999 broodyear, the total feed conversion was 0.85 to 1. Feeding rates ranged from 2.0% to 3.0% B.W./day.

**9.2.7) Fish health monitoring, disease treatment, and sanitation procedures.**

After ponding, fish are inspected by a fish health specialist on a monthly basis until release. Gills, skin, blood and internal organs are inspected for pathogens. The rearing program is reviewed, including fish density parameters, water flow, feeding program and fish loss. If loss is up and treatable pathogens are detected, prescriptions are given for treatment based on the pathologist review. Sanitation is conducted according to guidelines set out in the Fish Health Manual (1996).

**9.2.8) Smolt development indices (e.g. gill ATPase activity), if applicable.**

Not applicable.

**9.2.9) Indicate the use of "natural" rearing methods as applied in the program.**

Not used.

**9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.**

The intent is to rear localized hatchery-origin fish at this location.



## **SECTION 10. RELEASE**

**Describe fish release levels, and release practices applied through the hatchery program.**

### **10.1) Proposed fish release levels.**

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				
Fry				
Fingerling				
Yearling	300,000	6	April/May	Chambers Creek

### **10.2) Specific location(s) of proposed release(s).**

**Stream, river, or watercourse:** Chambers Creek (12.0007)  
**Release point:** Lakewood Hatchery-RM 3.4  
Chambers Creek Hatchery- RM 3.5  
**Major watershed:** Chambers Creek  
**Basin or Region:** Puget Sound

**10.3) Actual numbers and sizes of fish released by age class through the program.**

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1988								
1989								
1990								
1991								
1992								
1993								
1994								
1995								
1996								
1997								
1998							88,000	6 fpp
1999							95,000	6 fpp
2000							86,201	6 fpp
2001							89,011	6 fpp
Average							89,553	6 fpp

**10.4) Actual dates of release and description of release protocols.**

**Chambers Creek Hatchery**

Release Year	Life Stage	Release Range	Release Type
1997	Yearling	April	Volitional/Forced
1998	Yearling	April	Volitional/Forced
1999	Yearling	March/April	Volitional/Forced

**10.5) Fish transportation procedures, if applicable.**

Fish are transferred between sites to accommodate rearing and acclimation. Fish densities are below 0.75 pounds per gallon of tank water. Fresh flow aerators and 3 liters per minute oxygen are used. Hauling temperature is 57° F. Transfer time is less then 20 minutes per haul.

**10.6) Acclimation procedures**

Fish are acclimated on spring, well or surface water at both sites..

**10.7) Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.**

The 1997 brood year fish (1999 releases) are 100% adipose-fin clip/coded-wire tagged which will allow for selective fisheries (harvest opportunity) in mixed stock areas to minimize impacts on weak or protected stocks as well as identifying the hatchery fall chinook production, the NOR's, total survival, fisheries contribution and straying to other watersheds. The 1998 and 1999 broods were 100% mass marked (adipose-fin clip only).

**10.8) Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.**

No program surplus is expected. Program managed as per Future Brood Document (FBD).

**10.9) Fish health certification procedures applied pre-release.**

A fish health specialists inspects the population for pathogens before release and gives the okay to release.

**10.10) Emergency release procedures in response to flooding or water system failure.**

Fish are maintained on site or may be transferred to appropriate sites within watershed or Fish Health Management Zone to prevent fish loss or early release. If no site is available, then fish may be released into Chambers Creek as a last resort to prevent fish loss.

**10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.**

Fish released as yearlings quickly emigrate from the system and are away from nearshore areas when natural fish begin to appear. Limiting production/releases to current levels will help retain, and not forestall, potential future options for the recovery of the listed chinook ESU.

## **SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS**

### **11.1) Monitoring and evaluation of “Performance Indicators” presented in Section 1.10.**

The purpose of a monitoring program is to identify and evaluate the benefits and risks which may derive from the hatchery program. The monitoring program is designed to answer questions of whether the hatchery is providing the benefits intended, while also minimizing or eliminating the risks inherent in the program. A key tool in any monitoring program is having a mechanism to identify each hatchery production group.

Each production group shall be identified with distinct otolith marks, adipose clips, coded wire tags, blank wire tags or other identification methods as they become available, to allow for evaluation of each particular rearing and/or release strategy. This will allow for selective harvest on hatchery stocks when appropriate, monitoring of interactions of hatchery and wild fish wherever they co-mingle in riverine, estuarine and marine habitats and assessment of the status of the target population. WDFW shall monitor the Chinook salmon escapement into the target and non-target Chinook populations to estimate the number of tagged, un-tagged and marked fish escaping into the river each year and the stray rates of hatchery Chinook into the rivers.

#### **11.1.1) Describe plans and methods proposed to collect data necessary to respond to each “Performance Indicator” identified for the program.**

Refer to section 1.10

WDFW have/will collect remaining CWT's from returning adults. The 98' and 99' brood years were 100% mass-marked to allow for selective fisheries to minimize impacts on weak or protected stocks as well as identifying the hatchery fall chinook production and the, if any, NOR's. WDFW shall continue to apply an identifiable mark to 100% of the fall chinook yearlings to allow monitoring and evaluation (M & E) of the hatchery program releases and adult returns.

#### **11.1.2) Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.**

Funding and resources are currently committed to monitor and evaluate this program as detailed in the Resource Management Plan for Puget Sound Chinook Salmon Hatcheries (Washington Department of Fish and Wildlife and Puget Sound Treaty Tribes, August 23, 2002)

**11.2) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.**

Monitoring and evaluation will be undertaken in a manner which does not result in an unauthorized take of listed chinook.

## **SECTION 12. RESEARCH**

**12.1) Objective or purpose.**

**12.2) Cooperating and funding agencies.**

**12.3) Principle investigator or project supervisor and staff.**

**12.4) Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.**

**12.5) Techniques: include capture methods, drugs, samples collected, tags applied.**

**12.6) Dates or time period in which research activity occurs.**

**12.7) Care and maintenance of live fish or eggs, holding duration, transport methods.**

**12.8) Expected type and effects of take and potential for injury or mortality.**

**12.9) Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached “take table” (Table 1).**

**12.10) Alternative methods to achieve project objectives.**

**12.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project.**

**12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.**

## **SECTION 13. ATTACHMENTS AND CITATIONS**

Washington Department of Fish and Wildlife and Western Washington Treaty Indian Tribes. 1998. Co-Managers of Washington Fish Health Policy. Fish Health Division, Hatcheries Program. Washington Department of Fish and Wildlife, Olympia, Washington.

Seidel, Paul. 1983. Spawning Guidelines for Washington Department of Fish and Wildlife Hatcheries. Washington Department of Fish and Wildlife, Olympia, Washington.

Washington Department of Fish and Wildlife. 1996. Fish Health Manual. Hatcheries Program, Fish Health Division, Washington Department of Fish and Wildlife, Olympia, Washington.

Washington Department of Fish and Wildlife and Puget Sound Treaty Tribes, 2002, “Puget Sound Chinook Salmon Hatcheries, Resource Management Plan”, a component of Comprehensive Chinook Salmon Management Plan, August 23, 2002. 103 pages.

**SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY**

“I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973.”

Name, Title, and Signature of Applicant:

Certified by \_\_\_\_\_ Date: \_\_\_\_\_



Table 1. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Chinook ESU/Population: Puget Sound Chinook Activity: Yearling Chinook Program				
Location of hatchery activity: Chambers Creek / Lakewood Hatchery Dates of activity: August to July Hatchery program operator: WDFW				
Type of Take	Annual Take of Listed Fish By Life Stage ( <i>Number of Fish</i> )			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)				
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)			Unknown	
Intentional lethal take f)				
Unintentional lethal take g)	Unknown	Unknown	Unknown	
Other Take (specify) h)				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.

b. Take associated with weir or trapping operations where listed fish are captured and transported for release.

c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.

d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.

e. Listed fish removed from the wild and collected for use as broodstock.

f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.

g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.

h. Other takes not identified above as a category.